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ABSTRACT

A pilot project examined the effectiveness of computer assisted instruction (CAI) in teaching selected concepts of health and fitness: coronary risk, lifestyle, and nutrition as related to weight control. A convenience sample of 58 students from two Concepts of Health and Fitness classes were randomly assigned to two groups, both of which used Getchell's "Physical Fitness a Way of Life" (1983) as a classroom text. Each group also heard a lecture on lifestyle, using Breslow's and Enstrom's study of health habits and mortality. In addition to the text, the experimental group used three CAI programs, including activities on coronary risk, nutrition as it relates to weight control, and lifestyle. Results indicate that CAI may have had a beneficial effect in the experimental groups' performance on a test on the first textbook chapter, although no significant differences were observed between experimental and control group results on the second and third text chapters. For the first chapter, signficance may result from students spending more time on task, due to the novelty of the CAI format. A 22-item bibliography is included. (LMM)

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Use of Selected Computer Assisted Instruction (CAI) in Health Classes

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REVIEW OF RELATED RESEARCH

The importance of health education in the promotion of wellness and the prevention of disease cannot be denied. Many methods are used, but one that works well is personal counseling by health professionals; that is, a health lesson individualized for each person counseled. For example, face-to-face counseling has significantly reduced coronary risk factors in high-risk subjects. (1) However, its cost is quite high. Computer assisted instruction has been used in other areas of education to provide individualized lessons . In the past, the cost of a computer system and the technical sophistication required of its users limited its use in health education.

With the continuing decline in the cost of computer technology, the development and use of personal computers, and the increasing cost of human labor, it is worthwhile to evaluate the use CAI in health education. (2) Ellis and Raines (3) developed computer assisted instruction programs on a variety of health topics and reported that the user-perceived helpfulness for 420 volunteers very high.

Health education in colleges and universities has developed from the traditional lecture on hygiene to a more sophisticated approach designed to improve the overall health of students. During the past ten years an approach to health education has evolved that emphasizes behavioral and attitude changes. This new dimension has created a variety of curriculum approaches to assist students in doing something about their health and lifestyle.

Many health educators realize that good performance on examinations does not necessarily indicate that a student has the potential for

being healthy. Educators realize that most information is quickly forgotten or disregarded. (4) It is evident that there are people who know the dangers of smoking, as well as people who are grossly overweight, who fully understand the health hazards of their condition. This indicates that possessing health information alone does not mean that individuals will practice healthy behaviors. A major goal of health educators is to help students permanently improve the quality of their lives. (5) Thus, the health educator's role is not only to disseminate accurate, current health information, but to encourage individuals to be more responsible for their own health behavior and lifestyle. (6)

It can be assumed that hereditary, environment, and lifestyle can be classified as basic precursors to health. A study of 50,000 students by Irons and Thompson (7) indicated that lifestyles could contribute to future health problems. For example, they found that over 39% of the students admitted having irregular eating habits. Furthermore, 40% indicated they did not engage in any form of regular, strenuous exercise.

With the assumption that lifestyles seemed to be a major contributing factor to ill health among college students, Bensley (8) used a health risk appraisal for the purpose of modifying an individual's behavior. The computer print out and a counseling session were motivating factors for changes in lifestyle. Bensley felt health risk appraisals have great potential in college and university health courses.

Two areas that have received most attention for CAI are general health hazard appraisals (9,10,11) and nutrition. (12,13,14) Moody and Rienzo (15) worked with teens and reported that the Health Profile

model demonstrated its utility as a tool for capturing adolescent concern for making positive decisions regarding lifestyle and health. Students instructed by the various CAI dietary models were able to show mastery of diet concepts equal to that of students instructed by conventional methods. Attitudes of students were supportive of the instructional merits of CAI.

STATEMENT OF THE PROBLEM

Less than 40 years ago, the first electronic computer was put into use at the University of Pennsylvania. Such computers have been commercially available only since 1954; yet today academic computing is a billion dollar business. Most colleges and universities have their own computer or remote access to a computer facility. A survey conducted in the 1974-1975 academic year (16) indicated that 58% of the nation's secondary schools had some access to a computer. This year (1984),The Chronicle of Higher Education (17) reports that the percentage has risen to 88%. The computer has become an important basic tool for education.

Health education, however, has made very little use of this tool. (18,19) As mentioned earlier, health educators have as a major goal to assist students in permanently improving the quality of their lives. Of the ten leading causes of death in the United States since 1975, over half are believed to manifest as the result of one's lifestyle. It seems practical to identify present health risks and encourage prudent lifestyle behaviors. Methods and materials that encourage and make learning fun need to be utilized. CAI should be explored to examine its potential advantages and disadvantages in the field of health education in the college classroom. To date this information is

almost non existent in the professional literature. The purpose of this pilot project was to determine the effectiveness of CAI in teaching selected concepts of health and fitness classes. Concepts of health that were selected are: Coronary Risk, Lifestyle, and Nutrition as related to weight control.

METHODOLOGY

Sample

Students from two Concepts of Health and Fitness classes were selected as a convienence sample. Both classes met on Tuesday and Friday, the 8 am to 10:05 am section had 30 students, 20 women and 10 men. The 1:00 pm to 3:05 pm section had 28 students, 20 women and 8 men. The 1:00 pm class was randomly selected as the control group and the 8:00 am group as the experimental group.

The students range in age from 19 to 34 years of age. All but two students were required to take the course as part of their teacher certification program. There were no health education majors in the classes. The students in the experimental section were asked if they had or were taking any computer classes or if they owned a personal computer. A negative reply to both questions came from the students. The author taught both sections.

Instrumentation and Procedures

The experimental and control group both used Gethchell's "Physical Fitness a Way of Life" third edition, 1983 as a classroom text. Each group also heard the lecture on lifestyle, using Breslow's and Enstrom's study of health habits and mortality. (20) The lecture and test covering the lifestyle material was used in previous classes and

poor questions were revised or discarded. The students in each section were tested after each chapter.

In addition to the text, the experimental group used three computer assisted instruction (CAI) programs. The CAI programs included activities on coronary risk, nutrition regarding weight control and lifestyle. Coronary risk is an activity that uses the mathematical model for coronary heart disease risk described by Blackburn et al (21) in 1975. It is based on data from 40 to 50 year old men, but the program has been adapted for use with women and men from age 14 and up.

The activity first obtains the user's age, sex, cigarette consumption, cholesterol value, and blood pressure. Cholesterol level is usually not known by students, so the level is estimated from age and sex specific data. After all values are verified by the user of the program, the activity calculates the expected risk in terms of probability of a heart attack in the next five years and explains the meaning of this risk.

If the user smokes cigarettes, the activity displays a graph of how risk would vary with smoking from 0 to 60 a day. This is followed, by a graph of the variation of risk with changes in serum cholesterol. Persons with hypertension are given one of a graduated set of advice messages, depending on their blood pressure values.

Nutrition as it relates to weight control is an activity that requests the user's age, sex, weight, frame size, and height. The activity uses adult height/weight tables (22) so it is most accurate for those 20 years old and older, but the program has been adapted to accept ages as low as 17.

The activity determines the desirable body weight and compares this with actual weight. It then calculates basal metabolic rate (the

number of calories burned when you are at rest) and "inventories" daily activities to determine daily caloric expenditure. Assuming weight is stable, this is considered to equal caloric intake.

If the user is not within desirable weight limits, advice is given on the caloric decrease (or increase) necessary to achieve desirable body weight, and the user is allowed to examine repeatedly the effect of changes in caloric consumption on weight over different time periods.

Lifestyle is an activity that offers advice based on the effect of life habits on health and life expectancy. Approximately 30 questions are asked in eight major groups: (23) exercise, nutrition, alcohol consumption, drug use, tobacco use, personal health, safety, and a general category; ie. T.V. watching. There are no questions on age, sex, or race. Total score is reported and evaluated at the end of the activity and the user is rated as having an excellent, good, poor, or risky lifestyle. A bar graph displays subscores for each of the eight groups.

A post test only experimental control design was used to evaluate the project. Scores from the three standardized tests covering the appropriate content area were compared to determine if the CAI favorably affected the experimental group test performance.

In the beginning of the term the students in the experimental group were required to attend an hour and fifteen minute session on the use of the Apple microcomputer. Each student received a floppy disk with the health activities on it. The instructor showed each of the students how to use the Apple microcomputer. Each student was asked to insert the floppy disk into the disk drive and turn on the computer and screen. After "booting up" they were asked to type "help". The

software allows the user to interact with the activities without the need for prior experience. Once the program is "booted" any person can use it by following directions which are displayed on the monitor. The students practiced and were helped where necessary. The disks were returned to the instructor after the practice session. This practice session was also used to ask the students if they owned a computer or had any previous computer class experience. They all answered no to both questions. Students were asked not to share the disk with other students since this was a class assignment.

Just prior to the reading assignment and lectures on lifestyle, nutrition relating to weight control, and coronary risk factors the CAI floppy disks with the health activities were passed out to the experimental group. Each student was expected to "run" the CAI activities during that week and return it prior to the written exam. Each activity program on the disk has a question at the end of it that asks if the student enjoyed the task. This question can only be answered if the activity was completed. Students were told that the instructor was going to check to see that the assignment was in fact done.

The standardized paper and pencil test for the appropriate chapter was given the next class period immediately following the lectures, reading assignment, and CAI. A comparison of the post test scores between the control and experimental groups was done. Mean, standard deviation, and a T-test, was completed on the data collected.

Results of the Data Analysis

The purpose of this pilot study was to determine the effectiveness of CAI in health classes as measured by knowledge tests at the end of selected units of instruction. The experimental mean knowledge scores for the three chapter tests were 38.500, 36.100, and 49.567 respectively. The control group mean knowledge scores for the three chapter tests were 34.815, 36.148 and 48.815 respectively. The experimental group mean scores were higher than the control group mean scores on chapter 1 and chapter 3 unit tests.

There was a significant difference at the .05 level between the experimental and control group on the first chapter test as shown in Table 1. The tests for chapters two and three indicate no significant differences between the experimental and control group.

Table 1

Computer Assisted Instruction in Health Classes

SAMPLE	N	MEAN	S.D.	T	P
EXP1	30	38.500	7.347	2.054	.0423*
CON1	27	34.815	6.045		
* P < .05					
EXP2	30	36.100	6.619	.032	.4331
CON2	27	36.148	4.240		
EXP3	30	49.567	4.725	.573	.5724
CON3	27	48.815	5.174		

Discussion, Limitations, Recommendations

This pilot project suggests that CAI may have had a beneficial effect in the experimental groups performance on the chapter 1 test. No significant diferences were observed between experimental and control group results on chapters 2 and 3. Although no beneficial effects of CAI can be documented in chapter 2 and 3 test results. This instructional supplement likewise did not inhibit or negatively effect test results. In chapter one the significance may be due to students spending more time "on task". The CAI was very new to them, possibly even novel, as a result, the experimental group may have spent more time using the program during the first week.

Research seems to indicate that testing experience positively effect future test results. This may be reflected in the standard deviations of the chapter tests ranging from 7.3, in the first test, to 6.6, in the second test, to 4.7 in the third test. Thus, the full impact of CAI may not be identified during this time period. It is possible that CAI may take more than three chapter tests to measure the "real" impact.

One of the major limitations of this pilot study was the quasi-experimental design and specifically that initial group differences were not determined. There is a chance that the CAI brought the experimental group up to "par" with the control group, resulting in the true effect not being measured. This limitation leads to the recommendation that a pre-test and/or true experimental design be used in any future CAI efforts. Controlling for initial group differences would then be possible.

This pilot project indicates that the average classroom teacher can use CAI programs with the knowledge that no harmfull effects will come to the cognitive learning skills of his/her students, at least under the conditions of this pilot study. Addition benefits of CAI not examined in this pilot study include positive attitudes regarding innovative technology, self image, and new motor-skills. A great deal of research needs to be done in the area of CAI before a full report-card can be issued.

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